



WEST VIRGINIA

DEPARTMENT OF ENVIRONMENTAL PROTECTION

STATEMENT OF BASIS

**Former Private Trucking Operations
Union Carbide Corporation NITRO,
WEST VIRGINIA**

EPA ID NO. WVD 000739722

May 2016

Table of Contents

I.	Introduction.....	2
II.	Facility Background.....	2
A.	Site Geology.....	3
B.	Hydrogeology.....	4
C.	Hydrology.....	4
III.	Summary of Environmental History.....	5
A.	SWMU 1 Area.....	6
B.	SWMU 3 Area.....	7
C.	Central Waste-In-Place Area.....	8
D.	Central Commercial/Industrial Use Area.....	9
E.	SWMU 7	9
F.	SWMU 9	10
G.	Ryan's Branch Area	10
H.	Onsite Groundwater	11
I.	Offsite Groundwater	12
IV.	Corrective Action Objectives.....	13
A.	Soils.....	13
B.	Groundwater.....	13
V.	Proposed Remedy	13
A.	Land and Groundwater Use Restrictions	14
VI.	Evaluation of Proposed Remedy.....	15
A.	Threshold Criteria	15
B.	Balancing/Evaluation Criteria.....	16
VII.	Financial Assurance	17
VIII.	Public Participation	17

Attachment 1 Administrative Record File Index of Documents

Figure 1 Site Location Map

Figure 2 Site Map

I. Introduction

The West Virginia Department of Environmental Protection (DEP) has prepared this Statement of Basis (SB) to solicit public comment on its proposed remedy and the Post Closure Permit modification for the former Private Trucking Operations (PTO) Facility located in Nitro, West Virginia (Facility or Site). DEP's proposed remedy for PTO consists of groundwater recovery, groundwater monitoring, engineering controls consisting of capping and fencing, and institutional controls to implement land and groundwater use restrictions. The Post Closure Permit is being modified to incorporate the remedies proposed in this SB.

The Facility is subject to the United States Environmental Protection Agency's (EPA) Corrective Action program under the Solid Waste Disposal Act, as amended, commonly referred to as the Resource Conservation and Recovery Act (RCRA), 42 U.S.C. Section 6901, et seq. The Corrective Action program requires that facilities subject to certain provisions of RCRA investigate and address releases of hazardous waste and hazardous constituents, usually in the form of soil or groundwater contamination, that have occurred at or from their properties.

DEP is providing a forty-five (45) day public comment period on this SB and Post Closure Permit modification. DEP may modify its proposed remedy based on comments received during this period. DEP will announce its selection of a Final Remedy for the PTO Facility in a Final Decision and Response to Comments (Final Decision), after the public comment period has ended.

DEP will make a final decision on the modification of the Post Closure Care Permit after considering any information submitted during the public comment period. The Final Remedy will be incorporated into the Corrective Action Post Closure Care Permit. If no comments are received during the public comment period, the final Post Closure Care Permit will be signed and will become effective upon signature. Otherwise, the final Permit will become effective thirty (30) days after the service of notice of the final decision or upon conclusion of any appeals filed. EPA will issue a Final Decision and Response to Comments (FDRTC) after considering any comments submitted with respect to the Statement of Basis. The FDRTC will be incorporated into the final Corrective Action Permit and made a part thereof.

Information on the Corrective Action program as well as a fact sheet for the Facility can be found by navigating <http://www.epa.gov/reg3wcmd/correctiveaction.htm>.

II. Facility Background

PTO is located on State Route 25 in Nitro, West Virginia, which is approximately 2 miles west of Institute, West Virginia (Figure 1). The Facility is bounded on the south by the Kanawha River, to the north by State Route 25 and Gabbert's Branch Tributary, to the west by Gabbert's Branch, and to the east by Ryan's Branch and the Union Carbide Corporation Institute wastewater treatment plant (WWTP). The Facility is located within the Kanawha River 500-year floodplain. Because of onsite filling and grading, the land is relatively flat. North of the facility (northern side of State Route 25), the topography becomes steeper as the land transitions from the floodplain to the bedrock hills.

Between 1942 and the early 1970's, the Facility was used mainly by the Union Carbide Corporation (UCC) Institute Facility for the disposal and storage of chemicals, chemical byproducts, and construction debris. Disposal units for these chemicals and debris reportedly extended 10 to 15 feet below ground surface (bgs). Most disposal operations ceased after 1965 when the Goff Mountain Landfill opened. Between 1974 and 1975, a cleaning facility for tank trucks and rail cars was constructed in the eastern portion of the Facility. Cleaning fluids and rinsate from daily operations flowed into channel drains, which led to an onsite RCRA-regulated pretreatment system, Solid Waste Management Unit (SWMU) 9 that included three surface impoundments. The pretreatment system was taken out of service in 1985 after the cleaning facility ceased operations. With the exception of the active rail yard, the facility has been inactive since 1985. There are four primary land uses at the facility, described below:

- **Waste Management:** Approximately 16 acres of land generally consisting of SWMU 1, SWMU 3, SWMU 5, areas east and south of SWMU 5 where buried wastes are known or expected to be present, SWMU 7, and the portion of SWMU 9 where the former surface impoundments were closed in place.
- **Impacted Soil/Sediment Management:** Approximately 2 acres of land where a soil cover was installed in 2009/2010 over impacted soil and sediment in the Ryan's Branch area.
- **Industrial:** Approximately 16 acres of land consisting of an active rail yard and the Norfolk Southern easement. The rail yard is used for staging of railcars and supports manufacturing operations at the Union Carbide Corporation Institute Facility to the east.
- **Vacant:** Approximately 4 acres of land not currently being used; however, historical operations occurred in this area. A portion of SWMU 9 and all of SWMUs 6, 8, 10, and 12 are within this area. This area also is referred to as the Central Commercial/Industrial Use Area.
- **Undeveloped:** Approximately 9 acres of wooded land where no historical operations occurred.

A. Site Geology

The facility is located in the Appalachian Plateau physiographic province. Pleistocene and Quaternary alluvial deposits overlie bedrock within the Kanawha River Valley. The alluvium consists of variable and inter-bedded deposits of sand, silt, clay, and gravel. Bedrock formations in the area are part of the Pennsylvanian system, which consists of the Monongahela, Conemaugh, Allegheny, and Pottsville formations. These formations consist of alternating layers of massive, thick, and regionally discontinuous siltstone, sandstone, claystone, and shale (West Virginia Geological and Economic Survey [WVGES] 1996).

Information obtained from soil borings and well installations were completed at the Facility and are described below:

- **Geologic Unit 1 (Clay Unit)** – The uppermost geologic unit (Unit 1) is gray to brown, silty clay to sandy clay, with increasing sand and sand lenses near the base of the unit. The thickness of Unit 1 ranges from approximately 20 to 35 feet.
- **Geologic Unit 2 (Aquifer Unit)** - The second geologic unit directly beneath the Clay

Unit is brown, fine- to coarse-grained sand to silty sand, with trace to some gravel. The thickness of Unit 2 ranges from approximately 15 to 20 feet.

- Geologic Unit 3 (Bedrock Unit) - Bedrock is the lowermost unit (Unit 3) and consists of thinly bedded, micaceous, fine- to medium-grained gray sandstone. The bedrock is part of the Allegheny Group units from the Pennsylvanian System and occurs at approximately 45 to 55 feet bgs.

B. Hydrogeology

Groundwater

Aquifers in the region generally are grouped into two different aquifer types: unconsolidated alluvial aquifers and sedimentary bedrock aquifers. Recharge to these aquifer systems generally is from precipitation that infiltrates along the crests of hills, bedrock fractures, and bedding planes located in the upland region and discharges into the porous alluvial aquifers near the Kanawha River.

Unconsolidated alluvial aquifers in the region form in the major river valleys. The shape of the Kanawha River Basin prevents extensive shallow alluvial aquifer systems from forming, and those that are present are generally located in floodplains. This causes groundwater flow paths for the alluvial aquifer systems to be short and for shallow groundwater to generally discharge to the Kanawha River.

The uppermost groundwater occurs in discontinuous perched zones on top of low permeability horizons. Recharge into this zone is generally from precipitation, which is seasonal in nature, and limited by the low permeability cover materials placed over the entire facility. The perched zones are discontinuous, limited in aerial extent, and where present, occur at approximately 5 to 15 feet bgs. Groundwater occurs at approximately 15 to 27 feet bgs within the sandy base of Unit 1. This portion of Unit 1 has been generally described as soft, moist to wet, silty to sandy clay, or a moist to wet, clayey sand to sandy clay and likely represents a transition from the fine-grained cohesive soils above to the more granular Unit 2 below. Unit 2 consists of a confined aquifer typically encountered at approximately 30 feet bgs. Unit 2 is recharged primarily by infiltration from precipitation, but the fine-grained, low-permeability material located above the aquifer material limits local recharge. Unit 2 also receives a small amount of recharge from the bedrock hills located north of the facility.

The Kanawha River and its interaction with the groundwater flow system is the dominant hydrogeologic feature associated with the area. Groundwater flowing through Unit 2 appears to discharge to the Kanawha River. Temporary flow reversals may occur with surface water recharging groundwater for short periods during episodic flood events along the Kanawha River.

C. Hydrology

Surface Water

United States Geologic Survey (USGS) topographic maps show that the Site is located within a relatively flat plain in the Kanawha River Valley. Federal Emergency Management Agency (FEMA) flood insurance rate maps indicate the majority of the Facility is located between the 100-year and 500-year floodplains, with the areas near Ryan's Branch and Gabbert's Branch located in the 100-year floodplain.

The primary onsite hydrological features are two, small-order drainage systems (Gabbert's Branch and Ryan's Branch) that discharge to the Kanawha River. Both drainage features at normal conditions are about 2 feet wide, with surface water approximately 1 foot deep. Gabbert's Branch is on the western end of the facility (and its tributary along the northern facility boundary), and Ryan's Branch is in the southeastern corner of the facility. The tributary to Gabbert's Branch flows intermittently; when water is present, it flows east to west and discharges to Gabbert's Branch, which flows from north to south and discharges to the Kanawha River. Ryan's Branch flows through a culvert across the site and under the Norfolk Southern Railroad, where it opens to a restored open channel and discharges to the Kanawha River.

The predominant offsite hydrologic feature adjacent to the facility is the Kanawha River, along the facility's southern boundary. The normal pool elevation of the Kanawha River in this area is approximately 566 feet above mean sea level (amsl), and the elevation of the facility is approximately 590 feet amsl. According to data collected from the USGS stream gauging station located near Charleston, West Virginia, the average annual flow of the Kanawha River from 1941 to 2008 ranged from 8,649 to 20,960 cubic feet per second (cfs), with a mean value of 14,985 cfs (USGS 2009).

III. Summary of Environmental History

At one time, the facility operated three surface impoundments used for the storage and treatment of wastewater associated with the operation of an onsite wastewater pretreatment facility. The SWMUs at the facility initially were defined in the RCRA Part B permit application for the surface impoundments (SWMU 9). In August 1985, UCC submitted an RCRA Part B permit application to WVDEP for the wastewater pretreatment facility. Shortly after submittal, UCC decided to close the PTO facility, including the impoundments.

The former onsite wastewater pretreatment facility was used to treat wastewater generated from cleaning tank trailers and ancillary equipment, and wastewater from the four trailer heels storage tanks, steaming area, and railcar cleaning area. The SWMU was active from 1976 to 1985. The three surface impoundments were closed collectively as one unit in 1987. During closure, sludge wastes were combined into one basin, compacted and stabilized, and covered with a single engineered cap.

In 1987, the facility submitted an application for a post-closure permit for SWMU 9. The West Virginia Division of Natural Resources (WVDNR) requested modifications to the application, but the permit application was postponed so RCRA corrective action could be incorporated into the permit. In 1999, USEPA and UCC entered into a Facility Lead Agreement to conduct sitewide corrective action at the facility. In 2007, WVDEP requested that the facility apply for a post-closure permit for SWMU 9, which UCC submitted in June 2007. The January 2002 RCRA Facility Investigation Report defined the list of SWMUs to include thirteen SWMUs:

- SWMU 1 – Western Landfill
- SWMU 2 – Sodium Metal Area
- SWMU 3 – Former Clay-Lined Ponds
- SWMU 4 – Temik Disposal Area
- SWMU 5 – Ground Burner and Drum Disposal Area

- SWMU 6 – Incinerator (Teepee)
- SWMU 7 – Solid Waste Disposal Area
- SWMU 8 – Drum Storage Area
- SWMU 9 – Wastewater Pretreatment Facility
- SWMU 10 – Container Storage Pads
- SWMU 11 – Waste Oil Tank
- SWMU 12 – Heel Tanks and Dumpster
- SWMU 13 – Drum Disposal Area

A. SWMU 1 Area

Three SWMUs are collectively called the SWMU 1 Area. The three SWMUs, SWMU 1, SWMU 2, and SWMU 13 are collocated in the Western Landfill. The Western Landfill was in operation from approximately 1952 to 1978 and includes approximately 7 acres. The area was used for the disposal of Class II and Class III wastes; demolition wastes; anaerobic sludge and other solids from the Institute WWTP as well as sand, clay, and chemicals from plant spill/cleanup operations.

SWMU 2, the Sodium Metal Area, was created in the late 1970's when approximately 10,000 five-gallon cans of sodium metal waste packed in mineral oil were stored in a shed located within the eastern portion of SWMU 1. In 1977 and 1978, a fire involving the sodium metal occurred. The unburned containers might have been buried during efforts to extinguish the burning sodium metal.

In approximately 1975, the UCC South Charleston Facility sent 5,000 drums to PTO. The drums contained mostly solids and sludges. Two trenches were excavated along an east-west axis about 8 to 14 feet deep within the northwestern portion of the Western Landfill. The drums were crushed with a bulldozer blade, pushed into the trench, and covered with approximately 4 feet of compacted clay. The approximately 0.9 acre area was defined as SWMU 13.

An interim measure was completed in the mid-1980s at the SWMU 1 Area consisting of cover improvements and regrading to improve surface water drainage characteristics. The regraded area was seeded, fertilized, and mulched to establish a vegetative cover.

In 2012 an evaluation was completed to characterize the thickness, permeability, and chemical composition of the cover material of the SWMU 1 Area. Surface soil was evaluated to confirm "clean fill" was used for the soil cover. The minimum cover thickness measured during the evaluation was 3 ½ feet of stiff clay overlain by vegetated topsoil. Analytical results indicated arsenic, mercury, Aroclor-1260, and benzo(a)pyrene are present in surface soils at concentrations above the minimum, adjusted USEPA industrial soil regional screening level (RSL); however, it was concluded that the screening criteria exceedances do not preclude the cover material from being characterized as clean fill. Subsurface soil was not evaluated for the SWMU 1 Area because it is a waste management area.

Based on the cover evaluation, the soil cover is protective of human health and the environment; however, if intrusive activities are conducted within the SWMU 1 Area in the future, workers may potentially be exposed to buried waste or impacted soil. In addition, human

receptors could be exposed to VOCs in buried waste through vapor intrusion (VI) if new buildings are constructed on the SWMU 1 Area. Groundwater associated with the SWMU 1 Area is impacted by VOCs (primarily TCE, cis-1,2-dichloroethene, vinyl chloride, and 1,4-dioxane) at concentrations exceeding human health screening levels. Based on current land use, the groundwater exposure pathways are incomplete; however, human receptors could be exposed to constituents in groundwater in the future if groundwater is used as a potable source of water. TCE concentrations in groundwater exceed the ecological screening level in the western portion of the SWMU 1 Area; however, TCE was not detected in November 2015 from the most downgradient monitoring well (MW-131). TCE concentrations show an increasing trend in two monitoring wells (TW-01 and MW-105); however, the plume is not expanding and concentrations in downgradient monitoring wells are stable or decreasing.

B. SWMU 3 Area

The SWMU 3 Area includes SWMU 3 and most of SWMU 4. SWMU 3 includes two basins, each approximately 1 acre in area, 17 feet deep, and lined with 2 feet of clay, operated between 1950 and 1968. Reportedly, the basins were used to store coal hydrogenation and dripolene wastes, but at times stored or had been used to dispose of off specification products manufactured at the adjacent Institute WWTP. These products included acrolein, plyols, Tergitol, UCON fluids, Sevin, and Flexol plasticizer filter papers. In 1965, some of the basin contents were trucked to Goff Mountain Landfill. The remaining contents reportedly were covered with fly ash, limestone, nickel catalyst, and copper chromium catalyst. The ponds were then filled with construction and demolition waste and covered.

In 1972, approximately 25,000 pounds of 2 percent Temik were treated with lime and tilled into the ground; the Temik Disposal Area became SWMU 4.

Surface soil in the SWMU 3 Area was evaluated to determine where cover improvements were needed. The interim remedy for SWMU 3 was to improve the existing soil cover to further reduce infiltration of precipitation. Twelve inches of clay material was added in two 6-inch lifts and compacted to optimum moisture content as determined by a standard Proctor test (ASTM D698) to permeability less than 1×10^{-7} centimeters per second (cm/sec). Six inches of topsoil was placed over the clay and established with grass. The cover improvements were completed across the majority of the SWMU in 2012. Subsurface soil was not evaluated for the SWMU 3 Area because it is a waste management area.

Investigation results indicate non-aqueous phase liquid (NAPL) is confined to the buried waste within SWMU 3 and is not present within the lower sand aquifer beneath SWMU 3. NAPL also has been observed on the UCC Institute property to the east. Based on the NAPL observations in BCS-RW-01, the NAPL on UCC Institute property is residual and not mobile. Groundwater in the aquifer beneath the SWMU 3 Area is impacted by VOCs (primarily vinyl chloride and 1,4-dioxane) and SVOCs (primarily bis(2-ethylhexyl)phthalate [BEHP]) at concentrations exceeding the human health screening levels. Based on current land use, the groundwater exposure pathways are incomplete; however, human receptors could be exposed to constituents in groundwater in the future if groundwater is used as a potable source of water, or through VI if new buildings are constructed. BEHP concentrations in groundwater exceed the ecological screening level; however, BEHP concentrations in downgradient monitoring wells are

below the ecological screening levels, confirming groundwater is not affecting the Kanawha River.

C. Central Waste-In-Place Area

The Central Waste-In-Place Area includes nearly all of SWMU 5, SWMU 11, the location of former Building 100, and areas north, east, and south of SWMU 5 where buried waste is known or suspected to be present.

SWMU 5 is the former ground burner and drum disposal area and was located near the building foundation of former Building 100. The unit is believed to have been in operation between 1950 and 1967. The former ground burner was used to dispose of waste, including experimental materials from research and development, and filter papers from silicate processes. The burned wastes included products from the adjacent Institute WWTP and UCC South Charleston facilities, and possibly oily wastes from SWMU 3. After the ground burner was dismantled, approximately 13,000 drums were drained, crushed, and buried in the area. The crushed drums contained materials such as silicon chloride, carbon black, toluene diisocyanate, acetone washings, ethyl silicate filter papers, arsenic weed killer, acetylides, styrene (traces), benzene (traces), and cobalt complexes. SWMU 5 contains buried waste that exceeds human health risk screening levels for arsenic; BEHP; benzene; cis-1,2-dichloroethene (1,2,-DCE); benzo(a) anthracene; benzo(a) pyrene; benzo(b) fluoranthene; dibenzo (a,h) anthracene; indeno (1,2,3- cd) pyrene; tetrachloroethene; mercury; naphthalene; and vinyl chloride. The area outside of SWMU 5 but within the Central Waste-In-Place Area contains buried waste that exceeds human health risk screening levels for arsenic; BEHP; benzo(a) anthracene; benzo(a) pyrene; benzo(b) fluoranthene; mercury; and naphthalene.

The area defined as SWMU 11 contained two 1,000-gallon aboveground waste oil tanks that were located on the western side of former Building 100. The tanks were used between 1976 and 1997. They were emptied, cleaned, and transported offsite for disposal in conjunction with the demolition of Building 100.

The cover over the Central Waste-In-Place Area contained areas where potential direct contact could occur because of relatively thin cover thickness. The interim remedy for the area was to maintain a soil cover over buried waste to eliminate direct contact and maintain institutional and engineering controls to limit potential exposures to the buried wastes and contaminated groundwater by adding an additional 12 inches of cover material (6 inches of clay and 6 inches of topsoil) to the existing soil cover in the area.

If intrusive activities are conducted within the Central Waste-In-Place Area in the future, workers may potentially be exposed to buried waste or impacted soil. Groundwater beneath the Central Waste-In-Place Area is impacted by VOCs (primarily benzene, TCE including its degradation products, and 1,4-dioxane) at concentrations that exceed human health risk screening levels. Based on current land use, the groundwater exposure pathways are incomplete; however, human receptors could be exposed to constituents in groundwater in the future if groundwater is used as a potable source of water or through VI if new buildings are constructed.

D. Central Commercial/Industrial Use Area

This area consists of SWMUs 6, 8, 10, 12, the area surrounding these SWMUs and the area north and east of SWMU 9.

SWMU 6—Incinerator (Teepee) - The Teepee unit operated from 1956 to 1967. It was used to burn solid waste from the Institute WWTP and liquid waste prior to 1960. Waste included wood, paper, filter paper, and filter cake. No volatile materials were burned in this unit; volatiles were burned at SWMU 5.

SWMU 8—Drum Storage Area - Between 1976 and 1980, drums containing hazardous and nonhazardous waste were stored adjacent to the former heels shed area. During that time, drums were stored mainly on concrete, but some drums were stored on dirt and/or gravel. The drums were analyzed, treated, and removed in 1980.

SWMU 10—Container Storage Pads - Between 1976 and 1985, two container storage pads with concrete bases and curbing were used for storing drums. Details of the closure of container storage area were submitted in the WVDEP-approved closure/post-closure plan.

SWMU 12—Heel Tanks and Dumpster - Four 600-gallon heel tanks were located adjacent to the container storage pads. The tanks were used to store 2-ethylhexanol, acetone, methylhydropyran/LP40, and raw materials. The dumpster area near the former heels shed was used from 1976 to 1985 to handle nonhazardous solid waste. On occasion, heavy nonhazardous sludges were placed in the dumpster. These sludges were disposed of at Goff Mountain Landfill. Details of the closure storage tanks were submitted in the WVDEP approved closure/post-closure plan.

A screening-level Human Health Risk Assessment (HHRA) was performed to evaluate current and potential future exposures to soils in the Central Commercial/Industrial Use Area. Industrial workers were evaluated for potential exposure to surface soil (0 to 2 feet bgs) and construction workers were evaluated for potential exposure to surface and subsurface soil (2 to 12 feet bgs). The area was divided into two areas, Commercial/Industrial Use Area 1 and Commercial/Industrial Use Area 2, which are referred to as exposure area (EA) 1 and EA 2, respectively, in the screening-level HHRA. Potential cumulative carcinogenic risks and noncancer hazard indices (HIs) for surface soil were calculated for upper bound average concentrations (i.e., exposure point concentrations [EPCs]) for each area. Potential risks were within USEPA's risk management range of 1×10^{-6} to 1×10^{-4} , and noncancer HIs were reported below the threshold of 1.

E. SWMU 7

SWMU 7—Solid Waste Disposal Area - No records are available, but it is believed that construction waste, including concrete, wood, rail ties, and copper tubing, was buried in this location. Based on review of aerial photographs, waste disposal activities took place circa 1971.

In SWMU 7, arsenic and benzo(a)pyrene were the primary constituents that exceeded human health screening levels in surface and subsurface soil. BEHP also was detected in one sample above the screening level. SWMU 7 soil samples also were compared with ecological

screening levels, and the primary constituents that exceeded criteria included chromium, lead, mercury, silver, and selenium.

Potential exposures to surface soil (0 to 2 feet bgs) and subsurface soil (2 to 12 feet bgs) at SWMU 7 were evaluated in the Screening Level Risk Characterization Summary for SWMU 7; risk estimates were calculated based on EPCs and an industrial/construction worker exposure scenario. Carcinogenic risk estimates for surface and subsurface soils were within USEPA's risk management range of 1×10^{-6} to 1×10^{-4} , and the noncancer HIs were well below the noncancer HI threshold of 1. Groundwater in monitoring well OW-14, which is downgradient from SWMU 7, is impacted by VOCs (primarily 1,4-dioxane, tetrachloroethene, and TCE). Based on current land use, the groundwater exposure pathway is incomplete; however, human receptors could be exposed to constituents in groundwater in the future if groundwater is used as a potable source of water or if new buildings are constructed.

F. SWMU 9

SWMU 9—Wastewater Pretreatment Facility - The former onsite wastewater pretreatment facility comprises approximately 0.8 acre in the eastern portion of the facility along the SWMU 3 northern boundary and was used to treat wastewater generated from cleaning tank trailers and ancillary equipment, and wastewater from the four trailer heels storage tanks, steaming area, and railcar cleaning area. SWMU 9 was active from 1976 to 1985.

Wastewater was collected from the truck cleaning area, steaming area, and rail car cleaning area and transferred to the pretreatment facility. SWMU 9 consisted of pretreatment system components (i.e., tanks, sumps, piping, etc.) and three surface impoundments (equalization basin, sludge pond, and panic pond). Wastewater managed in the panic pond and equalization basin included spent cleaning materials and may have contained varying amounts of hazardous constituents from the facility or the trucks and tankers that were cleaned. Wastes managed in the sludge pond consisted of sludge from the oil separator and wastewater sumps.

The wastewater pretreatment facility was closed in accordance with RCRA standards in 1987. In 2009, WVDEP issued UCC a post-closure permit for the former surface impoundments. The post-closure permit serves as the enforceable mechanism that requires UCC to perform permit-related activities for the former surface impoundment. A RCRA cap was installed over the former surface impoundment when the SWMU was closed. Operation, maintenance, and monitoring of the former surface impoundments is completed in accordance with the post-closure permit.

G. Ryan's Branch Area

Soil in the Ryan's Branch Area was evaluated as part of the 2005 supplemental RCRA facility investigation and the Phase II RFI. The results from these investigations showed concentrations of BEHP and arsenic above the human health screening levels and concentrations of Aroclor-1260, mercury, and silver above ecological screening levels. Because of the findings an interim measure was completed in 2010.

In 1999, a recovery trench was installed on the embankment north of Ryan's Branch to intercept seepage from SWMU 3. The trench and associated piping were removed in 2010 when

the soil cover system was installed. In 2005, a low-permeability wall was installed in the Ryan's Branch Area near the Norfolk Southern box culvert in an attempt to control NAPL migrating from SWMU 3. Once the trench was excavated, a 60-mil low-density polyethylene curtain, along with a low-permeability backfill, was placed in the trench to inhibit NAPL from migrating to Ryan's Branch near the wall. In 2005, a seep area found on the slope of the embankment adjacent to SWMU 3 was excavated. Following excavation of the area (8 feet wide by 8 feet long), low-permeability backfill was placed into the excavation. From September 2009 to April 2010, a barrier was installed to isolate contaminated soil and sediment and reduce infiltration. The barriers north of the railroad tracks included placing low-permeability soil in Ryan's Branch up to the surrounding grade and, as a result, cover the slope adjacent to SWMU 3. The barrier south of the railroad tracks included placing a geosynthetic clay liner overlain by low-permeability soil and lining the stream channel with articulated concrete block. The cover system also included installing a culvert to convey stormwater from the area north of the Norfolk Southern property. During installation of the cover system, approximately 371 cubic yards of visually contaminated soil were removed and disposed of offsite.

An ERA performed before installing the soil cover system identified SVOCs (primarily BEHP), Aroclor-1260, mercury, and silver in the sediment and floodplain soils at concentrations posing potential risks to lower and upper trophic level ecological receptors. A subsequent Kanawha River investigation in 2008 indicated PAHs and BEHP were present in Kanawha River sediment at one location in the immediate vicinity of Ryan's Branch; the likely source of these constituents was Ryan's Branch sediment and floodplain soil. The location had constituent concentrations that represent a potential moderate to high incidence of toxicity to ecological receptors.

NAPL-impacted soil and sediment are present in the Ryan's Branch Area from past seepages of oily material through the sides of SWMU 3. NAPL has been observed intermittently in surface water downstream of this culvert. To temporarily remove the NAPL, a boom has been placed in Ryan's Branch. It is suspected, based on inspections that the NAPL is coming from a deformed portion of the culvert. The culvert will be repaired or replaced in 2016.

Groundwater beneath the northern portion of the Ryan's Branch Area is impacted primarily by 1,4-dioxane and BEHP at concentrations exceeding either the human health or ecological screening levels. Downgradient monitoring wells (MW107, MW-111D, and MW-111S) do not contain constituent concentrations exceeding ecological screening levels.

H. Onsite Groundwater

Semiannual groundwater sampling has been conducted for approximately 25 years at the facility for VOCs, SVOCs, and metals. An updated groundwater monitoring plan was submitted to and approved by WVDEP in September 2008. The current groundwater monitoring program is designed to monitor potential releases to groundwater from SWMUs, assist in evaluating remedial alternatives for groundwater, and monitor remediation progress, plume activity, and potential flux to the Kanawha River.

Groundwater at the facility is sampled in accordance with the groundwater monitoring plan. The results from the groundwater sampling are compared to the USEPA maximum contaminant levels (MCLs) or, if no MCL is available, the adjusted USEPA tap water RSLs. In addition, the analytical results also are compared to ecological screening

levels to evaluate if facility constituents may be affecting the Kanawha River. The ecological screening levels consist of the West Virginia water quality standards (chronic) or, if no West Virginia water quality standard was available, USEPA Region 3 Biological Technical Assistance Group freshwater benchmarks. Alternative screening levels, previously calculated for the UCC South Charleston Facility and UCC Institute Facility, are used for chlorobenzene, chloroform, 1,2-dichlorobenzene, 1,4-dioxane, and trichloroethene (TCE).

The most prominent constituents at the facility that exceed human health screening levels are TCE, vinyl chloride, 1,4-dioxane, and BEHP. The most prominent constituents at the facility that exceed ecological screening levels are TCE and BEHP. Other constituents that exceeded screening levels occur within the same boundaries of the plumes for the aforementioned constituents.

A summary of the 2014 groundwater monitoring results for the most prominent constituents at the facility is below:

- BEHP impacts are in the eastern portion of the facility associated with SWMU 3. BEHP was detected in samples from three monitoring wells at concentrations exceeding the human health screening level (6 micrograms per liter [$\mu\text{g/L}$]), with concentrations ranging from 9.35 to 74.2 $\mu\text{g/L}$. BEHP concentrations did not exceed the ecological screening level (16 $\mu\text{g/L}$) in samples collected from downgradient monitoring wells, including wells adjacent to the Kanawha River. Concentrations of BEHP at MW-85-5A show a decline over time and concentrations of BEHP in MW-85-4B fluctuate with no discernible trend. MW-85-4B is screened below SWMU 3, which is a historical source of BEHP in groundwater.
- TCE impacts are primarily in the western portion of the facility associated with the SWMU 1 Area. TCE concentrations exceed the ecological screening level (47 $\mu\text{g/L}$) in some monitoring wells within the SWMU 1 Area; however, concentrations are below the ecological screening level in the most downgradient monitoring well (MW-131). The maximum concentration of TCE was reported in the sample from MW-101 (734 $\mu\text{g/L}$). TCE concentrations for three monitoring wells (1B, MW-105, and TW-01) show an increasing trend while the concentrations in the other monitoring wells show a stable or decreasing trend. Groundwater impacts in monitoring well 1B are likely from an offsite source because this monitoring well is upgradient of known sources at the facility.

Although there are some monitoring locations onsite with increasing concentration trends, the extent of all plumes at the Facility have remained stable and groundwater concentrations for downgradient monitoring wells nearest to the Kanawha River are stable and do not exceed ecological screening values. Direct contact human health risk was not evaluated for groundwater because the depth, 15 to 27 feet bgs, precludes future construction worker exposure and groundwater is not currently used as drinking water and will not be used in the future.

I. Offsite Groundwater

Groundwater in monitoring wells near the western boundary contain concentrations of 1,4-dioxane and arsenic above the human health screening levels. Investigations were completed in October 2013 and February 2014 through January 2015 to evaluate offsite groundwater

impacts west of the facility. The results from these investigations showed that 1,4-dioxane concentrations were greater than the tap water RSL on several offsite parcels: WVDOT property (parcels 6, 7, 8, 9, and 10), and privately owned property (parcel 64). Parcels 11 and 12 are also suspected to be impacted based on the investigations. UCC finalized the purchase of parcels 11 and 12 in September 2015.

Arsenic was detected in four of thirteen samples, at concentrations ranging from 24.6 ug/L to 38.9 ug/L. All detected arsenic results were reported at concentrations greater than the MCL of 10 ug/L, but likely represent background rather than a contribution from historical site activities.

Groundwater in the eastern portion of the facility near SWMU 3 contains concentrations of TCE, vinyl chloride, 1,4-dioxane, and BEHP that exceed the human health screening levels. TCE and vinyl chloride are suspected to be from an offsite source; however, BEHP and 1,4-dioxane appear to be facility-related constituents that may be affecting a small portion of the UCC Institute Facility to the east and sidegradient of the facility.

IV. Corrective Action Objectives

DEP has identified the following Corrective Action Objectives for soils and groundwater at PTO:

A. Soils

DEP has determined that surficial soils do not pose an unacceptable human health risk for current industrial exposures; however exposure to subsurface soils and waste materials may pose an unacceptable risk for future workers.

Therefore, DEP's Corrective Action Objective for PTO soils is to control exposure to the hazardous constituents remaining in the subsurface by requiring compliance with and maintenance of land use restrictions and engineering controls.

B. Groundwater

DEP expects to return usable groundwater to its maximum beneficial use, which are generally levels acceptable for drinking. However, when waste is left in place, final cleanups should achieve groundwater cleanup levels at and beyond the waste unit boundary. Therefore DEP does not expect to clean up groundwater located within the boundaries of the waste management units to drinking water levels. However, redevelopment should be avoided in areas of unacceptable vapor intrusion risk and where necessary use institutional and engineering controls to prevent unacceptable exposures.

DEP's Corrective Action Objectives for PTO groundwater are to minimize infiltration and leaching to underlying groundwater, control exposure to the hazardous constituents remaining in the groundwater through engineering and institutional controls, and insure groundwater does not discharge to surface water at concentrations exceeding surface water quality criteria by monitoring groundwater to confirm ongoing protection of human health and the environment.

V. Proposed Remedy

The proposed remedy for PTO consists of various combinations of Institutional and

Engineering Controls (both existing and potential future controls) groundwater recovery, and groundwater monitoring. Specifically the remedy for each Area consists of:

- SWMU 1 Area – maintain the soil cover, institutional controls restricting land and groundwater use, and groundwater monitoring;
- SWMU 3 Area – maintain the soil cover, institutional controls restricting land and groundwater use, groundwater recovery, and groundwater monitoring;
- SWMU 7 – institutional controls and groundwater monitoring;
- SWMU 9 – Former Surface Impoundments – in addition to the current post-closure care permit, institutional controls restricting the land and groundwater;
- Central Waste-In-Place Area – maintain the soil cover, institutional controls restricting land and groundwater use, and groundwater monitoring;
- Central Commercial/Industrial Use Area – institutional controls restricting land and groundwater use and groundwater monitoring.
- Ryan’s Branch Area –maintain soil cover, stormwater management, institutional controls restricting land and groundwater use, and groundwater monitoring.

A. Land and Groundwater Use Restrictions

Because contaminants remain in the soil and groundwater at PTO above levels appropriate for residential use, DEP’s proposed remedy requires land and groundwater use restrictions to restrict activities that may result in exposure to those contaminants. DEP proposes that the restrictions be implemented and maintained through institutional controls (ICs). ICs are non-engineered instruments, such as administrative and legal controls, that minimize the potential for human exposure to contamination and/or protect the integrity of a remedy by limiting land or resource use.

DEP is proposing the following land and groundwater use restrictions be implemented through ICs:

- a) The PTO Facility shall only be used for non-residential;
- b) Impacted groundwater both onsite and offsite shall not be used for any purpose, including, but not limited to, use as a potable water source, other than to conduct the maintenance, remediation, and monitoring activities required by DEP and/or EPA;
- c) The owner shall notify DEP of all future construction activity at the facility in subsurface work restriction areas (reference figure 3-2, Institutional Controls), and demonstrate that such construction activity will not pose an unacceptable risk to human health or the environment. The construction activity shall not adversely affect the integrity of the selected remedy or the owner shall provide for the restoration of the selected remedy. The demonstration shall take into consideration existing site conditions including buried waste, impacted subsurface

- soils, impacted groundwater and potential vapor intrusion. The owner shall not commence construction activities until written approval is provided by DEP;
- d) Existing soil cover and cap shall be maintained to limit infiltration and prevent exposure in compliance with the approved Operations and Maintenance Plan;
 - e) All earth moving activities at the PTO Facility, subsurface work restriction areas (reference figure 3-2, Institutional Controls) including excavation, drilling and construction activities, shall be conducted in compliance with the an approved Soil Management Plan that includes appropriate Personal Protective Equipment requirements sufficient to meet DEP's acceptable risk and complies with all applicable OSHA requirements in a manner such that the activity will not pose an unacceptable threat to human health and the environment or adversely affect or interfere with the integrity of the final remedy;
 - f) The PTO Facility shall not be used in a way that will adversely affect or interfere with the integrity and protectiveness of the final remedy.
 - h) In the event there are any newly occupied buildings or new construction, it will be required that a vapor control system along with a monitoring /maintenance system and plan shall be put into place.

The land and groundwater use restrictions necessary to prevent human exposure to contaminants at PTO will be implemented through enforceable ICs such as a permit and/or an Environmental Covenant pursuant to the West Virginia Uniform Environmental Covenants Act (WV Code Chapter 20 Article 22B). If DEP determines that additional maintenance and monitoring activities, institutional controls, or other corrective actions are necessary to protect human health or the environment, DEP has the authority to require and enforce such additional corrective actions through an enforceable mechanism which may include a permit or Environmental Covenant, provided any necessary public participation requirements are met.

VI. Evaluation of Proposed Remedy

This section provides a description of the criteria DEP used to evaluate the proposed remedy consistent with EPA guidance, "Corrective Action for Releases from Solid Waste Management Units at Hazardous Waste Management Facilities; Proposed Rule," 61 Federal Register 19431, May 1, 1996. The criteria are applied in two phases. In the first phase, DEP evaluates three decision threshold criteria as general goals. In the second phase, for those remedies which meet the threshold criteria, DEP then evaluates seven balancing criteria to determine which proposed remedy alternative provides the best relative combination of attributes.

A. Threshold Criteria

1. Protect Human Health and the Environment - This criterion is met without additional remedial actions with respect to current risk. Engineering controls are currently in place to restrict access to the site and prevent disturbance of soil and waste to prevent exposure. The controls include a fence, an excavation permitting program, and an established health and safety plan (HASp). The proposed remedy will continue to protect human health and the environment from exposure to contamination, including future risks. Land and groundwater use restrictions will prohibit future uses that would pose an unacceptable risk through the use of an environmental covenant or other administrative mechanism.

2. Achieve Media Cleanup Objectives - DEP's proposed remedy meets the cleanup objectives appropriate for the expected current and reasonably anticipated future land use. The proposed

remedy meets the cleanup standards for current and future use of the land and groundwater, since the proposed remedy provides that all uses of the land are related to maintenance of the remedy and groundwater use is prohibited. No on-site receptors exist for groundwater. The use restrictions will eliminate future unacceptable exposures to both soil and groundwater.

3. Control the Source of Releases - In its RCRA Corrective Action proposed remedies, DEP seeks to eliminate or reduce further releases of hazardous wastes or hazardous constituents that may pose a threat to human health and the environment. Minor releases occurred during the life of the Facility. Removal of the waste materials are impractical and current controls, future controls, and the proposed remedy eliminate exposure, potential future releases and unacceptable risk.

B. Balancing/Evaluation Criteria

1. Long-Term Reliability and Effectiveness - The proposed remedy of containment will maintain protection of human health and the environment over time by controlling exposure to the hazardous constituents remaining in soils and groundwater. The long term effectiveness is high, as ECs and ICs are readily implementable and easily maintained. The capping and monitoring are easily maintained and highly effective in the long run.

2. Reduction of Toxicity, Mobility, or Volume of Waste - The proposed remedy is not designed to reduce the toxicity or volume of waste. Wastes were placed in the PTO Facility beginning decades ago prior to environmental regulation and the objective of the remedy is to eliminate exposure and risk to human health and the environment, which it will. The wastes are immobile.

3. Short-Term Effectiveness - PTO is restricted by features including fencing, topography, dense vegetation, and the Kanawha River, which restricts access. Soil cover and capping are completed. Groundwater is not used for any purposes other than monitoring or maintenance; therefore the proposed remedy's short-term effectiveness is high.

4. Implementability - DEP's proposed remedy is readily implementable. The remedy will be implemented using existing monitoring wells and existing controls. DEP proposes that the ICs be implemented through an enforceable mechanism such as the permit and/or an Environmental Covenant pursuant to the West Virginia Uniform Environmental Covenants Act. Therefore, DEP does not anticipate any regulatory constraints in implementing its proposed remedy.

5. Cost - The total cost for the proposed remedies is minimal since they are already constructed. Ongoing monitoring, maintenance, and reporting costs are minimal as an annual O&M cost. The annual estimated cost for years with one groundwater sampling event is \$194,000.00. The estimated annual cost for years with two groundwater sampling events is \$216,000.00.

6. Community Acceptance - There have been no known conflicts within the community regarding the investigation and remediation efforts. Ultimately, community acceptance of DEP's proposed remedy will be evaluated based on comments received during the public comment period and will be described in the Final Decision and Response to Comments.

7. State/Support Agency Acceptance - WVDEP has reviewed and concurred with the proposed remedy for PTO. Furthermore, EPA has provided input and been involved throughout the investigation and remedy selection process.

VII. Financial Assurance

UCC will be required to demonstrate and maintain financial assurance for completion of the remedy pursuant to the standards contained in West Virginia regulations. The Permittee shall maintain compliance with 40 CFR §264.17, Subpart H by providing financial assurance, as required by 40 CFR §264.17, Subpart H, in at least the amount of the cost estimates required by section.

VIII. Public Participation

Interested persons are invited to comment on DEP's proposed remedy. The public comment period will last thirty (45) calendar days from the date that notice of the start of the comment period is published in a local newspaper. Comments may be submitted by mail, fax, e-mail, or phone to Tracy A. Jeffries at the address listed below.

A public hearing will be held upon request. Requests for a public hearing should be made to Jason McDougal of the WVDEP Office by phone 304-926-0499 or by email at Jason.S.McDougal@wv.gov. A hearing will not be scheduled unless one is requested.

DEP may modify the proposed remedy based on new information and/or public comments. Therefore, the public is encouraged to review the Administrative Record and to comment on the proposed remedy presented in this document.

The Administrative Record contains all the information considered by DEP for the proposed remedy at this Facility. The Administrative Record is available to the public for review and can be found at the following location:

West Virginia Department of Environmental Protection
Division of Land Restoration
Office of Environmental Remediation
601 57th Street SE Room 1073
Charleston, WV 25304
Contact: Tracy A. Jeffries Phone:
(304) 926-0499 ext. 1262
tracy.a.jeffries@wv.gov

Attachment 1 Administrative Record File Index of Documents

Figure 1 Site Location Map

Figure 2 Site Map

ATTACHMENT 1
STATEMENT OF BASIS
ADMINISTRATIVE RECORD FILE
INDEX OF DOCUMENTS

CH2M HILL. 2002. Documentation of Environmental Indicators Determination Union Carbide Corporation Private Trucking Operations Facility.

CH2M HILL. 2005a. Documentation of Environmental Indicators Determination Union Carbide Corporation Private Trucking Operations Facility.

CH2M HILL. 2005b. *Supplemental RCRA Facility Investigation Report, Private Trucking Operations, Nitro, West Virginia.* April.

CH2M HILL. 2008a. *Groundwater Monitoring Plan, Private Trucking Operations Facility, Nitro, West Virginia.* August.

CH2M HILL. 2008b. *Technical Memorandum - Phase II Investigation Summary, Private Trucking Operations, Nitro, West Virginia.* October.

CH2M HILL. 2008c. *Kanawha River Investigation, Private Trucking Operations, Nitro, West Virginia.*

CH2M HILL. 2009a. *Technical Memorandum - Summary of 2006 Sitewide Phase I RCRA Facility Investigation, Private Trucking Operations Facility, Nitro, WV.*

CH2M HILL. 2009b. *Technical Memorandum - Summary of Western Area Groundwater Activities, Private Trucking Operations Facility, Nitro, WV.* July.

CH2M HILL. 2009c. *Technical Memorandum - Screening Level Human Health Risk Assessment for the Proposed Reuse Area Private Trucking Operation Facility, Nitro, West Virginia.* February.

CH2M HILL. 2009d. *Technical Memorandum - Test Pit Investigation Summary in SWMU 1/13 Private Trucking Operations Facility Nitro, West Virginia.*

CH2M HILL. 2009e. *Technical Memorandum - Pre-Design Investigation Summary for SWMU 3, Private Trucking Operations Facility, Nitro, West Virginia.*

CH2M HILL. 2009f. *Technical Memorandum – Updated Screening Level Human Health Risk Assessment for the Proposed Reuse Area, Private Trucking Operation Facility, Nitro, West Virginia.* May.

CH2M HILL. 2009g. *Screening Level Risk Characterization Summary for SWMU 7, Private Trucking Operations Facility, Nitro, West Virginia.*

CH2M HILL. 2010. *Technical Memorandum – Natural Attenuation Evaluation for the PTO Facility, Nitro, West Virginia.*

CH2M HILL. 2011a. *Construction Completion Report, Ryan’s Branch Remedy Implementation, Private Trucking Operations Facility, Nitro, West Virginia.* June.

CH2M HILL. 2011b. Letter to Erich Weissbart; RE: UCC Response to the 1/26/2011 EPA Comments on the Private Trucking Operations Current Conditions and Updated Risk Assessments Reports. December 28.

CH2M HILL. 2012. *SWMU 3 Remedial Approach Report, Private Trucking Operations Facility, Nitro, West Virginia.* August.

CH2M HILL. 2013a. *Screening-Level Human Health Risk Assessment for the Proposed Reuse Area, Former Private Trucking Operations Facility, Nitro, West Virginia*. January.

CH2M HILL. 2013b. *UCC Private Trucking Operations SWMU 1 Cover Evaluation, Former Private Trucking Operations Facility, Nitro, West Virginia*. January.

CH2M HILL. 2013c. *UCC Private Trucking Operations June 2012 Groundwater Monitoring Report, Former Private Trucking Operations Facility, Nitro, West Virginia*. March.

Federal Emergency Management Agency (FEMA). 1985. National Flood Insurance Program Firm Flood Insurance Rate Map Kanawha County, West Virginia.

Kemron Environmental Services, Inc. (Kemron). 2002. *RCRA Facility Investigation Report, Nitro, West Virginia*. EPA ID #WVD000739722. January.

Kemron Environmental Services, Inc. (Kemron). 2003. *Additional RCRA Facility Investigation Report, Nitro, West Virginia*. EPA ID #WVD000739722.

Manufacturing Management Services, Inc. (MMS). 2001. *Union Carbide Corporation Private Trucking Operations Historic Study*, Institute West Virginia. April.

Union Carbide Corporation (UCC). 2007. *Post-Closure Permit Application, Former RCRA Surface Impoundments, Solid Waste Management Unit 9, Private Trucking Operations Facility*. June.

Union Carbide Corporation (UCC). 2008. *Revised Post-Closure Permit Application, Former RCRA Surface Impoundments, Solid Waste Management Unit 9, Private Trucking Operations Facility*. June.

Union Carbide Corporation (UCC). 2009a. Hazardous Waste Management Permit, Permit ID No.: WVD 000 739 722, Private Trucking Operations, Nitro, West Virginia. May 11.

U.S. Environmental Protection Agency (USEPA). 2011. Letter from Erich Weissbart; RE: Comments on UCC Private Trucking Operations Current Conditions Report and Updated Risk Assessments. EPA ID: WVD000739722, Nitro, West Virginia. January 26.

U.S. Geologic Survey (USGS). 2000a. *Water Quality in the Kanawha–New River Basin West Virginia, Virginia, and North Carolina, 1996-98*. By Katherine S. Paybins, Terence Messinger, James H. Eychaner, Douglas B. Chambers, and Mark D. Kozar. U.S. Geologic Survey Circular 1204.

U.S. Geologic Survey (USGS). 2000b. *Environmental Setting and Its Relationship to Water Quality in the Kanawha River Basin*. By T. Messinger and C.A. Hughes. Water Resources Investigation Report 00-4020.

U.S. Geologic Survey (USGS). 2009. National Water Information System: Web Interface. http://waterdata.usgs.gov/wv/nwis/uv/?site_no=03198000&PARAMeter_cd=00065,00060,62614

West Virginia Department of Environmental Protection (WVDEP). 2009. Hazardous Waste Management Permit, Union Carbide Corporation Private Trucking Operations Closed Surface Impoundments – SWMU 9, EPA ID No.: WVD 000 739 722. June 5.

West Virginia Department of Natural Resources (WVDNR). 2003. Letter from Barbara Sargent, Wildlife Diversity Program. September 2003.

West Virginia Geological and Economic Survey (WVGES). 1996. *West Virginia Geology: Physiographic Provinces*. By Peter Lessing.